Work Order ID 83688

April-23-12 3:58:13 PM

83688

Item ID: D6104-011 **Accept** *N900040100* **Setup Start** *NS1*

Revision ID: **Stop** *NS2*

Item Name: 17-4 SS Roundbar 6.50"OD

Start Date: 23/04/2012 **Start Qty:** 20.00 *20*

Required Date: 07/05/2012 **Req'd Qty:** 20.00 *20*

Reference:

Cust Item ID:

Customer:

Approvals: **Process Plan:** MCJ **Date:** 12/04/24 **Tooling:** **Date:** **Run Start** *NR1*

QC: **Date:** **SPC (Y/N):** **Date:** **Stop** *NR2*

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
Draw Nbr	**Revision Nbr**								
D6104	Rev B								
100		0.00							
100	PURCHASING								
Purchasing									
Purchasing	**Memo**	0.00							
	Issue P/O: 16815 a)Description: S.S round billet b) Ø6.50" x 4.100" longc) Tolerance on all dimensions are +0.030"/-0.000"d) Material: 17-4PH Stainless steele) Min UTS = 170 KSI (38 HRc) Material certification required								CL 12/04/24 (20)
110	Receive & Inspect for Damage & Mat'l Certs	0.00							
110									
Packaging									
Packaging	**Memo**	0.00							
	Ensure material certification is attached								12/6/2 (20)
120	QC6- Inspect dimensions to drawing	0.00							
120									
QC									
Quality Control	**Memo**	0.00							
	Ensure Material certification comply to Dwg D6104								20

12/5/13

Dart Aerospace Ltd

W/O:		WORK ORDER CHANGES					
DATE	**STEP**	**PROCEDURE CHANGE**	**By**	**Date**	**Qty**	**Approval** Chief Eng / Prod Mgr	**Approval** QC Inspector

Part No: _____ **PAR #:** _____ **Fault Category:** _____ **NCR:** Yes No **DQA:** _____ **Date:** _____

Resolution: _____ **Disposition:** _____ **QA: N/C Closed:** _____ **Date:** _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	**STEP**	**Description of NC** Section A	**Corrective Action** Section B			**Verification** Section C	**Approval** Chief Eng	**Approval** QC Inspector
			Initial Chief Eng	**Action Description** Chief Eng	**Sign & Date**			

NOTE: Date & initial all entries

Work Order ID 83688

April-23-12 3:58:13 PM

83688

Item ID: D6104-011 **Accept** *N900040100* **Setup Start** *NS1*

Revision ID:

Item Name: 17-4 SS Roundbar 6.50"OD **Stop** *NS2*

Start Date: 23/04/2012 **Start Qty:** 20.00 *20*

Required Date: 07/05/2012 **Req'd Qty:** 20.00 *20*

Cust Item ID:

Customer:

Reference:

Approvals: **Process Plan:** **Date:** **Tooling:** **Date:** **Run Start** *NR1*

QC: **Date:** **SPC (Y/N):** **Date:** **Stop** *NR2*

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
130	Identify as per dwg & Stock Location: CNC	0.00							
130									
Packaging	**Memo**	0.00							
Packaging									
140	QC21- Final Inspection - Work Order Release	0.00							
140									
QC	**Memo**	0.00							
Quality Control									

SA 12/5/13 20

12/5/13

12-05-3

Dart Aerospace Ltd

W/O:		WORK ORDER CHANGES					
DATE	**STEP**	**PROCEDURE CHANGE**	**By**	**Date**	**Qty**	**Approval** Chief Eng / Prod Mgr	**Approval** QC Inspector

Part No: _____ **PAR #:** _____ **Fault Category:** _____ **NCR:** Yes No **DQA:** _____ **Date:** _____

Resolution: _____ **Disposition:** _____ **QA: N/C Closed:** _____ **Date:** _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	**STEP**	**Description of NC** Section A	**Corrective Action** Section B			**Verification** Section C	**Approval** Chief Eng	**Approval** QC Inspector
			Initial Chief Eng	**Action Description** Chief Eng	**Sign & Date**			

NOTE: Date & initial all entries

Picklist Print

April-23-12 3:58:17 PM

Work Order ID: 83688

83688

Parent Item: D6104-011

D6104-011

Parent Item Name: 17-4 SS Roundbar 6.50"OD

Start Date: 23/04/2012 **Required Date:** 07/05/2012

Start Qty: 20.00 **Required Qty:** 20.00

Comments: IPP A02.12.02New Issue KJ/RF

Component Item ID/ Item Name	Replacement Item ID	Mfg/ Purch	Bin Item	Primary Location	Last Location	Route Seq ID	Unit of Measure	Qty on Hand	Qty per Kit	Total Qty	Qty Issued	Date Issued	Status
D6104-011P		Purchased	No			110	Each	0.0000	1	20			
D6104-011P									**				
17-4 SS Roundbar 6.50"OD													

4/19/12 (2e)

Dart Aerospace Ltd

W/O:		WORK ORDER CHANGES					
DATE	**STEP**	**PROCEDURE CHANGE**	**By**	**Date**	**Qty**	**Approval** Chief Eng / Prod Mgr	**Approval** QC Inspector

Part No: _____ **PAR #:** _____ **Fault Category:** _____ **NCR:** Yes No **DQA:** _____ **Date:** _____

Resolution: _____ **Disposition:** _____ **QA: N/C Closed:** _____ **Date:** _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	**STEP**	**Description of NC** Section A	**Corrective Action** Section B			**Verification** Section C	**Approval** Chief Eng	**Approval** QC Inspector
			Initial Chief Eng	**Action Description** Chief Eng	**Sign & Date**			

NOTE: Date & initial all entries

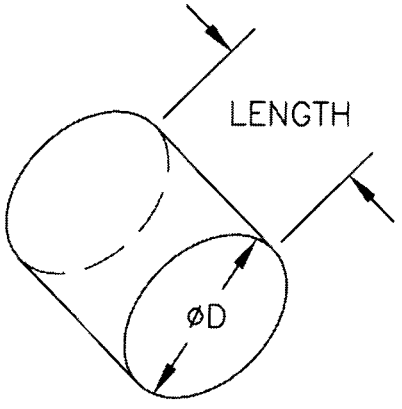
DESIGN	DRAWN BY	DART AEROSPACE LTD HAWKESBURY, ONTARIO, CANADA
CHECKED	APPROVED	DRAWING NO. D6104 Rev. B SHEET 1 OF 1
DATE 02.11.25		TITLE ROUND BILLET, 17-4 SCALE NTS

A	01.04.10	NEW ISSUE
B	02.11.25	CLARIFY ALLOY SPEC ADDED D6104-009/-011 REDUCE LENGTH OF BILLETS

QA COPY ISSUED

RELEASED
02-11-29

SPECIFICATION CONTROL DRAWING



SHOP COPY
RETURN TO
ENGINEERING
UNCONTROLLED COPY
SUBJECT TO AMENDMENT
WITHOUT NOTICE
WORK ORDER
NO. 836886
12/04/27

MATERIAL: 17-4 PH SS (AMS 5643 OR AISI 630) MIN UTS = 170 KSI (38 HRc)

PURCHASE MATERIAL ACCORDING TO THE FOLLOWING TABLE. SPECIFY ALLOY, DIAMETER x LENGTH (+0.030/-0.000) AS SHOWN.

TOLERANCE ON ALL DIMENSIONS IS +0.030/-0.000.

ALL DIMENSIONS ARE IN INCHES

Part No.	Alloy	D (Diameter)	Length
D6104-001	17-4 PH STAINLESS STEEL	Ø3.00	3.80
D6104-003	17-4 PH STAINLESS STEEL	Ø3.25	3.80
D6104-005	17-4 PH STAINLESS STEEL	Ø4.00	5.10
D6104-007	17-4 PH STAINLESS STEEL	Ø4.50	5.10
D6104-009	17-4 PH STAINLESS STEEL	Ø5.25	4.10
D6104-011	17-4 PH STAINLESS STEEL	Ø6.50	4.10

Dart Aerospace Ltd

W/O:		WORK ORDER CHANGES					
DATE	**STEP**	**PROCEDURE CHANGE**	**By**	**Date**	**Qty**	**Approval** Chief Eng / Prod Mgr	**Approval** QC Inspector

Part No: _____ **PAR #:** _____ **Fault Category:** _____ **NCR:** Yes No **DQA:** _____ **Date:** _____

Resolution: _____ **Disposition:** _____ **QA: N/C Closed:** _____ **Date:** _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	**STEP**	**Description of NC** Section A	**Corrective Action** Section B			**Verification** Section C	**Approval** Chief Eng	**Approval** QC Inspector
			Initial Chief Eng	**Action Description** Chief Eng	**Sign & Date**			

NOTE: Date & initial all entries

Castle Metals®

A. M. Castle & Co.

PACKING SLIP/ CERTIFICATE OF CONFORMANCE

Shipment No:1290876

Ship From:	Sold To:	Ship To:	Deliver To:
A. M. Castle & Co. (Canada) Inc. MONTREAL 835-SELKIRK AVENUE POINTE CLAIRE, QUEBEC H9R 3S2	DART AEROSPACE LTD 1270 ABERDEEN HAWKESBURY, ON K6A 1K7 CA	DART AEROSPACE LTD 1270 ABERDEEN HAWKESBURY, ON K6A 1K7 CAN	DART AEROSPACE LTD 1270 ABERDEEN HAWKESBURY, ON K6A 1K7 CA

Date Shipped	F.O.B.	Freight Terms	Carrier	BOL No
30-APR-2012	ORIGIN	Prepaid	MANITOULIN	1290876-2

Shipment Details	Final Destination Branch - MON

Order No	Line No	Item No	Description
2157373	4	15003.MO	6.5000.RD.17CR-4NI.STAINLESS.RT.SOL TR.COND A.120.0000-168.0000 CUT TO 4.1 IN (+ .1250/- .0000 IN) - BAND SAW CUTTING SPECIFICATIONS: AMS 5643

Purchase Order No	Part Number	Ordered Qty	Invoice Qty
16815	YOUR ITEM NUMBER: D6104-011	20.00 PCS	20.00 PCS

Details

Delivery No.	Mill	Heat Number	Mech Id	PCS	Width (IN)	Length (IN)	Shipped Qty(LBS)
117575211	SCOT FORGE COMPANY	G18555		20			800.91

These commodities/technologies are subject to US Export Administration & US State Dept. Regulations and, if intended for export, were/are exported thereunder. Diversion contrary to US Law is Prohibited.

We hereby certify the material covered by this certification conforms in accordance with the above specifications and has been found to meet the applicable requirements for the material, including any specifications forming a part of the description. Test reports are on file subject to examination. All claims for defective material are waived unless made in writing to A.M. Castle & Co. within 60 days of the shipment. Material cut to the correct size, or material cut by the customer cannot be returned for credit.

Reviewed by Authorized Castle Metals Representative:		Date:	Name:

Date Printed: 30-APR-2012 02:22:43 PM

SCOT FORGE
8001 Winn Rd., Box 8
Spring Grove, IL 60081
847/587-1000
FAX 847/587-2000

PO # 139586
MATERIAL CERTIFICATION

H00160 3 SS
Heat # G18555

SOLD	Shipping Information	Material Cert Number
CASTLE METALS 1420 KENSINGTON RD, STE 220 Oak Brook, IL 60523		727491 w5161R1
		Revision Date
		01/25/2012

Item 1 of 1

Material	Castle Metals Specification 3174-02 Rev:34, ASME SA-564 Type 630 Cond"A" 2010 Edition, 2011 Addenda, ASTM A 564-10 Type 630 Condition "A", AMS 5643R Condition "A", AMS 2303F, UNS# S17400
Heat Treat	per Specification
Destructive Test	per Specification
Finish	Rough Machine with allowance to finish Straightness = 1/8" in 5 FT allowing .063" to .083" stock on diameter
Reference	Access Code: 15003
Size	OD: 6.5 — Random Len: 108 to 156 — (inches)
Surface	500 RMS — Saw Cut

Heat Number	# of Pieces	(MILL - UNIVERSAL STAINLESS)
G18555	4	MSDS Previously Sent

Note:Additional prefix letter stamped on product with heat number is for our inventory purposes only and not relevant to heat number.

Chemical Composition (Wt. %)

C	Mn	P	S	Si	Ni	Cr	Mo	Cu	Al	V
0.032	0.77	0.021	0.002	0.40	4.74	15.23	0.32	3.26	0.03	0.04

Cb	N	Ta	B	Co	Sn	Ti	W
0.26	0.029	<0.01	<0.001	<0.05	006.	<0.01	<0.05

Cb+Ta
0.27

Mechanical Properties:

Pcs	Tensile PSI	Yield[1] PSI	Elongation %	Reduction of Area %	Comments
1	201,573	179,396	12.3	42.1	H900 CAP/LONG

[1](Offset: .2%)

Rockwell Hardness Results:

Pcs	Rockwell "C"
1	43

Jerry Giessinger
Corporate Quality Assurance Manager
This certification has been created and reviewed in compliance with the Scot Forge QMS

Note: The recording of false, fictitious or fraudulent statements or entries on this document may be punishable as a felony under Federal Statute.

SCOT FORGE
8001 Winn Rd., Box 8
Spring Grove, IL 60081
847/587-1000
FAX 847/587-2000

PO # 139586
MATERIAL CERTIFICATION

H00160 3 SS
Heat # G18555

CASTLE METALS

Material Cert Number
727491 w5161R1

Brinell Hardness Results:

Pcs	3000 Kg Load
4	321

Other Testing or Inspections:

Solution anneal at 1900 degrees F for 10 hours
Age at 900 degrees F for 1 hours

ALL STEEL HAS BEEN MELTED AND MANUFACTURED IN THE UNITED STATES

PIECE TEMP AT START OF SOLUTION ANNEAL: 1900 DEG F

PIECE TEMP AT FINISH OF SOLUTION ANNEAL: 86 DEG F

COOLING METHOD SOLUTION ANNEAL: POLYMER

COOLING METHOD AGE: AIR

CAST METHOD - INGOT

NO WELD REPAIRS PERFORMED

FREQUENCY = .00 SEVERITY = .00 PER AMS 2303

MICRO EXAM PERFORMED PER AMS 2315; RESULTS 0.2% DELTA FERRITE

MACRO ETCH PERFORMED BY EXOVA, DATED 1/20/12 (SEE ATTACHED)

16.24:1 FORGING REDUCTION FROM ORIGINAL INGOT

Compliance Statements:

We certify that the material listed was not processed with mercury bearing instruments and/or equipment which might cause contamination, nor was mercury handled in the immediate vicinity during the manufacturing process. We also certify that the material was not processed or cleaned with low melting point materials as alloying constituents, i.e. lead, zinc, cadmium, tin, antimony, bismuth, sulfur, or their compounds.

In accordance with the requirements of the Pressure Equipment Directive, all testing, inspection, and documentation is produced in accordance with EN 10204:2004 Type 3.1 and ISO 10474 Type 3.1.B

Material provided has been produced by Scot Forge under an approved quality program as defined within the Scot Forge QA Manual, Revision 3, Dated 08/17/11.

Jerry Giessinger
Corporate Quality Assurance Manager
This certification has been created and reviewed in compliance with the Scot Forge QMS

Note: The recording of false, fictitious or fraudulent statements or entries on this document may be punishable as a felony under Federal Statute.

SCOT FORGE
8001 Winn Rd., Box 8
Spring Grove, IL 60081
847/587-1000
FAX 847/587-2000

PO # 139586

MATERIAL CERTIFICATION

H00160 3 SS
Heat # G18555

CASTLE METALS

Material Cert Number
727491 w5161R1

Compliance Statements:

The products supplied are in compliance with the quantity and quality requirements of the purchase order and specifications noted. The test reports represent the actual attributes of the items furnished and the test results are in full compliance with all applicable specifications and order requirements.

CASTLE METALS - CLE

HEAT NUMBER G18555
MECHANICAL ID
ITEM CODE 15003
LOT NUMBER 010306
PO NUMBER 139586
RECEIPT DATE 2-1-12
SUPPLIER Scot Forge
LOT
QUANTITY
APPROVED KB

Note: The recording of false, fictitious or fraudulent statements or entries on this document may be punishable as a felony under Federal Statute.

Jerry Giessinger
Corporate Quality Assurance Manager
This certification has been created and reviewed in compliance with the Scot Forge QMS

Exova
2090 East 15th Avenue
Gary
Indiana
USA
46402

T: +1 (219) 882-4283
F: +1 (219) 885-6577
E: sales@exova.com
W: www.exova.com

CUSTOMER: Scot Forge
8001 Winn Road
Spring Grove, IL 60081-0008
Attn: Dennis Behrens

Issue Date: January 20, 2012
Ref. No.: G201114
PO#: Q58052/056115
Received: 1-17-12

MACROETCH RATING

Sample Identification	Macroetch Rating
B-G18555-TOP	No pipe, cracks, porosity, segregation, inclusions, or other imperfections observed.
B-G18555-BTM	No pipe, cracks, porosity, segregation, inclusions, or other imperfections observed.

This material was tested under the Exova Quality Assurance system documented in QA Manual, Rev. 4, dated July 9, 2008. The recording of false, fictitious or fraudulent statements or entries on this document may be punished as a felony under the federal law.

Specimen preparation and testing performed in accordance with: ASTM E340-00 (06) & AMS 5643R Para. 3.4.1**.

Etching reagent used is a 1:1 mixture of HCl and water at 160 degrees F for 15 to 30 minutes.

This is to certify that the test results as contained in this report are those as contained in the company records. Test results shown in this report relate only to the items tested. Information contained in this report regarding identification, material, and/or sampling procedure is based on customer furnished information and is shown for reference purposes only.

Gary Richter
General Manager

E.Z.

By: _____
Cruz Munoz, Lab Manager
Signed for and on behalf of Exova

Exova is accredited by The American Association for Laboratory Accreditation (A2LA Cert. No. 188.01) in the field of Mechanical Testing, including Spectrographic and LECO combustion Chemical Analysis. This report shall not be reproduced except in full without the prior written approval of Exova.

*DENOTES THE LABORATORY IS ACCREDITED TO THE IDENTIFIED TEST METHOD BY A2LA BUT NOT BY NADCAP.
**DENOTES THE LABORATORY IS NOT ACCREDITED TO THE IDENTIFIED TEST METHOD BY A2LA OR NADCAP. Exova SUBMITS THIS CERTIFICATION AS THE CONFIDENTIAL PROPERTY OF OUR CLIENT. IT SHALL NOT BE REPRODUCED EXCEPT IN FULL, WITHOUT THE WRITTEN APPROVAL OF Exova. THE RECORDING OF FALSE, FICTICIOUS OR FRAUDULENT STATEMENTS OR ENTRIES MAY BE PUNISHED AS A FELONY UNDER THE FEDERAL LAW.